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LRIT-RELATED MATTERS

Proposal for the establishment, operation and maintenance of the International LRIT Data Exchange and Data Centre

Submitted by the Republic of the Marshall Islands

SUMMARY

Executive summary:	This is a Proposal for the establishment, operation and maintenance of the International LRIT Data Exchange and Data Centre submitted by the Republic of the Marshall Islands on behalf of an LRIT Consortium consisting of Pole Star Space Applications Limited, GateHouse A/S and Wallem Innovative Solutions (hereinafter referred to as "the Consortium").
Action to be taken:	Paragraph 5
Related documents:	Resolutions MSC.202(81), MSC.210(81), MSC. 211(81); Request for Proposals IMSO/2007/LRIT/006

Background

1 The International Mobile Satellite Organization (IMSO), in its capacity as the LRIT Co-ordinator appointed by the Committee, in a Request for Proposals, ref: IMSO/2007/LRIT/006, has invited interested parties to submit proposals for the establishment, operation and maintenance of the International LRIT Data Exchange (IDE) and International LRIT Data Centre (IDC) in the LRIT System (hereinafter referred to as "the System"), in accordance with the standards, criteria and procedures set out in the related documents above.

2 SOLAS Contracting Governments were to submit proposals by 3 July 2007 for itself or on behalf of interested parties to the Committee for consideration at its eighty-third session (MSC 83), to be held in Copenhagen, Denmark from 3 to 12 October 2007.

3 In addition to being circulated for consideration by the Committee, proposals will be forwarded, upon receipt by the Secretariat, to IMSO, the LRIT Co-ordinator, for evaluation. The LRIT Co-ordinator will then submit an evaluation report for each proposal to MSC 83 by 14 August 2007.

4 Under the above understanding, the Republic of the Marshall Islands hereby respectfully submits in the annex a Proposal being put forward by an LRIT Consortium consisting of Pole Star Space Applications Limited, GateHouse A/S and Wallem Innovative Solutions. It is submitted without obligation or intent to be involved in any way in the LRIT Consortium.

Action requested

5 The Committee and IMSO are invited to consider the attached Proposal and decide as appropriate.

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ANNEX

LONG RANGE IDENTIFICATION AND TRACKING OF SHIPS (LRIT)

This Proposal for the establishment, operation and maintenance of the International LRIT Data Exchange and Data Centre is submitted on behalf of the LRIT Consortium.

THE LRIT CONSORTIUM consisting of Pole Star Space Applications Limited, GateHouse A/S and Wallem Innovative Solutions (hereinafter referred to "the Consortium") is pleased to submit this proposal via the International Maritime Organisation (IMO) Maritime Safety Committee (MSC) to the International Mobile Satellite Organisation (IMSO), in its capacity as the International LRIT Co-ordinator appointed by the IMO, which in the associated Request for Proposals ref: IMSO/2007/LRIT/006 invited interested parties to submit proposals for the establishment, operation and maintenance of the International Data Exchange (IDE) and International Data Centre (IDC) in the International LRIT System (hereinafter referred to as "the System").

RECALLING that resolution MSC 211(81) on Arrangements for the Timely Establishment of the Long Range Identification and Tracking System recognises the need to put in place arrangements with a view to ensuring the prompt establishment of the International LRIT Data Centre and of the International LRIT Data Exchange as well as the need for testing and confirming the function of the LRIT system as envisaged in the LRIT architecture;

RECALLING further that resolution MSC 211(81) recommends Contracting Governments to take early appropriate actions to ensure that all necessary infrastructures are in place, timely, for the establishment of the LRIT system;

RECOGNISING that the financing of the System is central to the success of the overall LRIT program, and to-date there has been no commitment made by the IMO, IMSO nor any Contracting Government to finance the set-up of the System;

RECOGNISING further that to-date no Contracting Government has committed to utilise the services of the System and so finance the ongoing operation of the System;

THE LRIT-CONSORTIUM PROPOSES the following:

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ANNEX 1 – MANAGEMENT PROPOSAL

1 Overview

1.1 The Consortium state from the outset that due to the difficulties in implementing a fully compliant technical solution in the specified timeframe, coupled with a complex costing and billing model, combined with the absence of any form of financial commitment from the IMO or associated SOLAS Contracting Governments to provide either start-up or operational funding, an innovative solution is required in order to start the project and subsequently meet the sustainability requirements of the International community and the Consortium.

1.2 After significant technical and financial analysis by the Consortium, an approach to the development and operation of the System is proposed that combines a workable technical and financial model to ensure success of the overall LRIT program. A simplified financial model is proposed that is fair and equitable to all parties, operating over the following two-phases:

.1 *Phase 1a*
In this phase it is proposed to develop a System *operationally compliant to the MSC.210(81) Performance Standard* using existing proven and resilient commercial systems, licensed by the Consortium's primary partners, and enhanced to comply with the basic communication protocol, system security performance requirements and external interface to the Data Distribution Plan (DDP). This strategy allows for an operationally-compliant System to be implemented in the shortest possible timeframe with the minimum risk.

.2 *Phase 1b*
In this 3 year operations phase where the System is utilised by Contracting Governments for a combination of Flag-, Port-, and Coastal-State tracking, and where on an annual basis any revenue generated from usage that exceeds the quoted budgetary requirements will be accumulated to create a set-aside budget for the implementation in Phase 2a of a fully technically compliant System.

.3 *Phase 2a*
In this phase it is proposed to upgrade the System to be fully *technically compliant* to the technical specifications developed by the MSC Ad-Hoc Working Group on Engineering Aspects of LRIT (hereinafter referred to as "the AHWG").

.4 *Phase 2b*
In this 2 year operations phase where, similarly to Phase 1b, on an annual basis any revenue generated from usage that exceeds the quoted budgetary requirements will be accumulated to create a set-aside budget to fund future enhancements to the System.

1.3 In the proposed simplified financial model a dual-user concept is introduced whereby a Contracting Government may be a "provider" and / or "user" of System services i.e. a Contracting Government *providing* its flagged-ships to the System for LRIT management and a Contracting Government *using* the System to obtain LRIT information respectively. To participate in the System, all Contracting Governments – both providers and users - will be

required to take out a funded subscription. The Consortium, through IMSO and the IMO, will seek early subscription commitments from Contracting Governments in order to provide the comparatively small start-up budget required for Phase 1a.

1.4 This proposal has taken into account the core documentation prepared by the IMO as specified in Section 4.2 of the IMSO RFP and it is the view of the Consortium that the proposal includes sufficient technical, operational, financial, legal and administrative detail to allow IMSO to evaluate the proposal and the MSC to take a decision on where the IDE and IDC shall be located and who will operate it.

1.5 In expectation that in the timeframe from the MSC LRIT Intersessional (July, 2007) to MSC 83 (Oct, 2007) inclusive, Contracting Government(s) do commit to subscription and usage, and assuming the proposed financial model is approved in principle, then the Consortium commits to entering into detailed contract negotiations with IMSO and the IMO Secretariat in order to conclude a formal agreement for the provision of the LRIT facilities concerned. At this stage detailed plans and costings can be presented and discussed, and the legal aspects detailed in the IMSO RFP addressed i.e. data protection assurances, legal regime and organisational status.

1.6 This proposal is valid until 31st December 2007. In the event that post-MSC 83 (Oct, 2007) there remains no commitment to use the System, the Consortium reserves its right to retract this proposal on the grounds that the financial model is unsustainable.

1.7 For purposes of technical and financial modelling it has been assumed that an approximate total of 20,000 ships will be managed by the System *on behalf* of those Contracting Governments not establishing a National Data Centre (or joining with a Regional or Collaborative Data Centre).

2 About the Consortium

2.1 It is the Consortium's view that our combined core competencies cover all the necessary areas required in order to efficiently implement and deliver the System. However, if it is considered that the proposal has weaknesses then the Consortium will take guidance from the IMO, IMSO and Contracting Governments regarding suggestions for additional partners e.g. the location of a geographically separate backup facility.

2.2 Pole Star and GateHouse have actively participated in all of the AHWG sessions and consequently have significant contextual knowledge and technical understanding of the overall LRIT program. Furthermore, Pole Star as representatives of Comite International Radio-Maritime (CIRM) was appointed as the Office of Primary Interest for the DDP by the AHWG.

2.3 The Consortium's primary partners include (Refer to Annex 4 for further information):

.1 *Pole Star Space Applications Limited (UK)*
An Application Service Provider (ASP) having core competencies in: satellite communications management systems relating to commercial ship tracking services (SOLAS V/28), ship security alert systems (SOLAS XI/2-6), and National LRIT Data Centre solutions (SOLAS V/19-1).

.2 *GateHouse A/S (Denmark)*
A software development company having core competences in: IALA compliant vessel tracking systems (Helcom, Safety@Sea, USCG satellite based vessel tracking), general tracking and analysis applications, satellite communication protocols and software development in accordance to international recognised standards such as ISO 9001:2000 and CMMI level 3.

.3 *Wallem Innovative Solutions (Philippines)*
A Business Process Outsourcing (BPO) organisation have core competencies in the provision of 24/7 user support operations.

.4 *Singapore Telecommunications Limited (Singapore)*
A global communications organisation having core competencies in: the provision of global Inmarsat C communication services, facilities hosting and associated system management.

2.4 The legal formulation of the Consortium will be decided during the contract negotiation phase. A formal Joint Venture (JV) may be established between two or more of the partners or alternatively services offered by one or more of the partners may be based upon a traditional commercial service provision contract to the other partner(s).

3 Project Management

3.1 A senior management team will be put in place to ensure effective project execution. Particular emphasis will be placed on meeting the schedule and internal consortium / external project budgetary milestones. Pole Star, as the primary partner located in London and with easy access to both IMSO and the IMO, will act as Consortium Point-of-Contact and provide a dedicated Project Manager (PM) to undertake the task. GateHouse will provide a dedicated Technical Manager to work closely with the PM.

3.2 Schedule

The following schedule is proposed:

Activity / Phase	Date Range	Duration (months)
Contract negotiation inc. technical / financial clarification	Oct-07 to Dec-07	3
Phase 1a (Development)	Jan-08 to Jun-08	6
Phase 1b (Operations)	Jul-08 to Jun-11	36
Phase 2a (Development)	Jul-10 to Jun-11	12
Phase 2b (Operations)	Jul-11 to Jun-13	24

Table 1 - Project Schedule

3.3 A delay to the contract negotiation and Phase 1a start-date will cause a resultant equal delay to the Phase 1b deliverable.

3.4 Phase 1b includes the pre-operational testing phase running Jul-08 to Dec-08 where the System will undergo internal integration testing and also testing with participating external Data Centres. Phase 1b also includes the bridging operation phase running Jul-10 to Jun-11 during the Phase 2a development.

3.5 Staff

The following senior staff are nominated from each organization:

.1 *Pole Star – Julian Longson, Director (Business Development)*
Julian graduated from the UK's Cranfield Institute of Technology in 1986 with an MSc in Applied Remote Sensing (Satellite Earth Observation) following a BSc in Environmental Science from Newcastle in 1985. His career to-date has consisted of 20 years in the satellite telematics business with a range of international organisations based in the UK, US, Canada and Italy - he has been with Pole Star / Purplefinder since its start-up in 1998. His current responsibilities specifically involve initiatives relating to LRIT compliance – with active involvement at the IMO MSC, COMSAR sub-committee and as part of the MSC Ad-Hoc Working Group on Engineering Aspects of LRIT is the designated Office of Primary Interest (OPI) for the Draft Guidance on the Data Distribution Plan.

.2 *GateHouse – Flemming Friche Rodler, Business Development Manager*
Flemming graduated from the University of Aarhus, Denmark in 2001 with a Ph.D. in Computer Science and in 2006 he graduated from Aalborg University, Denmark with a Graduate Diploma in Business Administration. Since 2001 Flemming has worked with software development, with roles such as a R&D scientist, project manager and business developer. Current responsibilities include project management of national AIS systems and business development with focus on LRIT and the GateHouse generic tracking system and coastal surveillance applications.

.3 *WIS – Patrick Slesinger, Director and CIO*
Patrick joined Wallem in December 1992. He is a member of Wallem Group's Executive Committee and is responsible for Information Technology, including telecommunications, for the group worldwide. In 2000 he was responsible for establishing Wallem Group's Software Development and Business Process Off-shoring Centre in the Philippines, WIS Clark. This facility provides Wallem, its clients and third parties cost effective world-class systems development and process management. Patrick is the past Chairman of the Intertanko IT Committee, and a keen advocate of intra-industry Information Technology and software development collaboration.

3.6 The Consortium partner’s reserve the right to switch out staff with replacement senior executives subsequent to contract negotiations and clarification of specific project roles, responsibilities and tasks.

3.7 Meetings

Subsequent to contract negotiation and award the following meetings will be held in London (and additionally where specified):

- Project Kick-Off.
- Phase 1a Quarterly System Development Status Reviews
- Phase 1b Bi-annual Operations Status Reviews – Clark (Philippines)
- Phase 2a Quarterly System Development Status Reviews – Nørresundby (Denmark) and Singapore.
- Phase 2b Bi-annual Operations Status Reviews – Clark (Philippines)
- Monthly Project Status Reviews – Web / Net-based.

3.8 Note that quarterly and bi-annual meetings will replace the monthly project status review meetings where schedule overlap occurs.

3.9 In order to facilitate an efficient, focussed and productive meeting methodology a formal process will be adhered to (inc. production of agenda, minutes, actions / reporting, etc.). Phases 1a and 2a, as system development-based phases, will follow a traditional project / software development reporting method. Phases 1b and 2b, as operations-based phases, will follow a Service Level Agreement (SLA) and Key Performance Indicator (KPI) reporting method.

ANNEX 2 – TECHNICAL PROPOSAL

4 Overview

4.1 This proposal is for the establishment, operation and maintenance of the International Data Centre (IDC) and the International Data Exchange (IDE). It is the view of the Consortium that the IDC and IDE must be considered as integrated subsystems in order to take advantage of co-development, co-location and co-management efficiencies.

4.2 For purposes of technical and financial modelling it has been assumed that an approximate total of 20,000 ships will be managed by the System *on behalf* of those Contracting Governments not establishing a National Data Centre (or joining with a Regional or Collaborative Data Centre).

5 Project Management

5.1 Overall Project Management will be undertaken by Pole Star. A dedicated Project Manager (PM) will be allocated to the project subsequent to contract negotiation and award. All options will be considered with respect to the most efficient utilisation of the PM including possible secondment to / or co-location at IMSO.

5.2 The PM is answerable for the success of the Project, which will include the following areas of responsibility:

- Prepare all Project Schedules and Plans
- Issue full Schedules of Work to client and involved parties for approval
- Assign all required resources to the Project, including Engineering, Logistics, and Materials/Equipment.
- Monitor actual Project Progress against agreed Schedules and Plans.
- Use defined Project Processes to manage Quality, Risks, Changes, Issues and Financial Implications
- Monitor Project Performance and Publish Project Status data at key stages throughout the Project.
- Manage day-to-day Project tasks and escalate any Issues that impact on the Project Performance and Timetable
- Provide updates or adjustments to the Project Plan as necessary to ensure the project continues to meet the Key Deliverables defined at the start of the Project.
- Assist with Acceptance Testing and Manage hand-over of completed Project to client to the agreed Schedule

5.3 Technical Management

5.4 Overall Technical Management will be undertaken by GateHouse. A dedicated Technical Manager (TM) will be allocated to the project subsequent to contract negotiation and award. The TM's specific responsibilities will be detailed at the contract negotiation stage.

6 Phase 1a

6.1 In this 6-month phase, scheduled from 1st January 2008 to 30th June 2008, the System will be developed to be operationally compliant to the MSC.210(81) Performance Standard using a combination of Pole Star's Purplefinder™ and GateHouse's ghTRACK™ systems. Both systems are proven and resilient commercial systems and require only basic enhancements to comply with the Performance Standard. Utilising and building on our existing systems will reduce financial, technical and schedule overrun risks.

6.2 Furthermore, by utilising existing systems the Consortium is able to provide each subscribing Contracting Government with a web-based User Interface (UI) having basic LRIT interface functionality including fleet visualisation, command and control (polling), and housekeeping (registration / deregistration of ships). It should be noted that a LRIT UI is not considered nor specified as part of the System.

6.3 Whilst efforts will be made to align the Phase 1a implementation to the technical specifications developed by the AHWG, in the interests of expediency and delivering the pre-operational System by the 1-July deadline, the specifications will only be used as guidance.

6.4 The following subsystems will be re-used and developed from the Purplefinder and ghTRACK systems:

- Shipborne equipment integration
- Communications service interface
- Database management (IDC)
- System management, monitoring and reporting
- User management
- Security
- Accounts / Billing
- Routing (IDE)

6.5 Basic enhancements will be made to comply with the defined:

- Communication protocol
- External interface to the Data Distribution Plan (DDP).

6.6 A detailed implementation plan will be developed at the start of Phase 1a subsequent to contract negotiation and award.

7 Phase 1b

7.1 In this 36-month phase, scheduled from 1st July 2008 to 30th June 2011, System support services including hosting, provision of communications and user support operations will be provided as follows:

7.2 International LRIT System Facility – SingTel EXPAN

7.3 EXPAN is a Pan Asian chain of world-class Data Network Centres, owned and built by SingTel, Asia's leading communications company. It provides secured hosting environment equipped with state-of-the art facilities where customers can host their servers and have the option to outsource their IT and network systems and operations. Data Centre resources can be easily scaled to the customer's business needs.

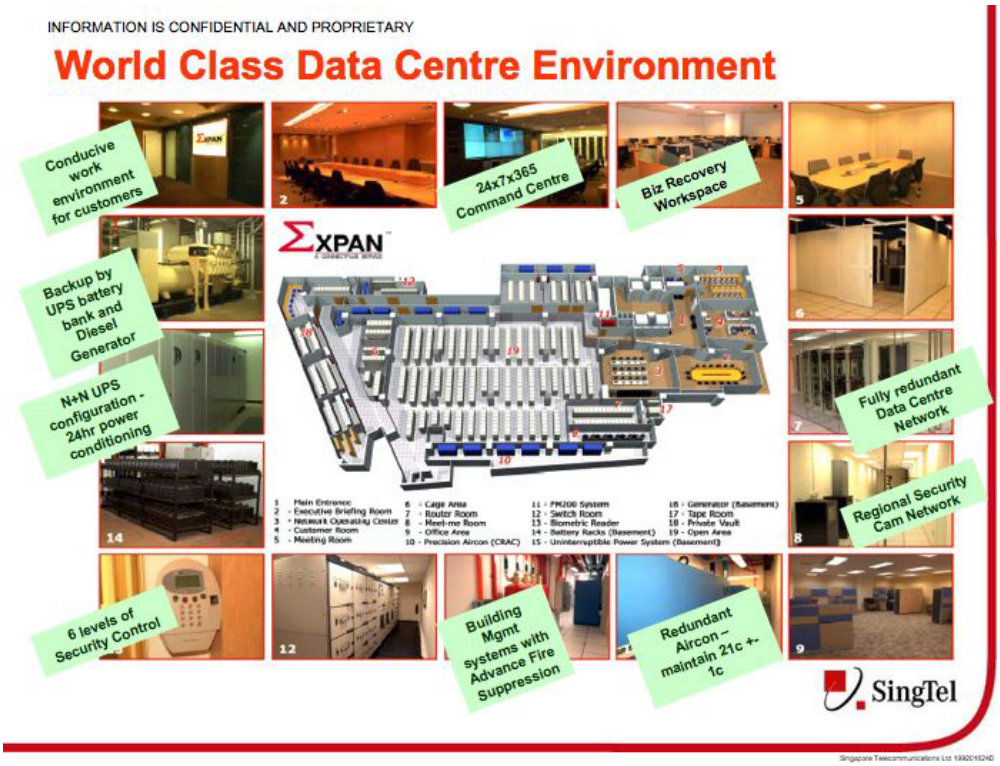

Figure 1 -SingTel's World Class Data Centre Environment

7.4 Quality of Service Certification

- EXPAN Quality of Service BS7799 defines best practices for information security management systems (ISMS)
- It ensures Confidentiality, Integrity and Availability of data in a data centre environment
- BS7799 Certified – Over 100 security controls observed

7.5 Information security best practice in:

- Security Policy
- Organization of assets and resources
- Asset classification and control
- Personnel security
- Physical and environmental security
- Communications and operations management
- Access control
- Systems development and maintenance
- Business continuity management
- Compliance – to avoid breaches of criminal or civil law

7.6 EXPAN Disaster Recovery Certification

- SS507 Certified – BC / DR Standard Developed by Infocomm Development Authority in Singapore.

7.7 Disaster Recovery Best Practice In:

- Physical Access Controls
- Physical Facility and Security
- Environmental Controls
- Telecommunication
- Power Supply
- Cable Management
- Fire Protection
- Location of Recovery Site
- Emergency Operation Centre (EOC)
- Restricted Facilities
- Physical Facility and Equipment Life Cycle
- Training and Education

7.8 Industry Certifications

- Cisco Powered Network (CPN) - Endorsed by Cisco as a highly secure, fully redundant and resilient network environment.
- Certified by HP - Data centre with documentation of procedures and key operational processes tested and executed. Ensures that the infrastructure in place provides integrity of services
- SunTone Certified - Certified under The SunTone Program, led by Sun Microsystems, Inc., this collaborative industry effort defines best practices and audits the service provider's infrastructure, operational practices, hardware, software and overall service delivery.

7.9 International LRIT System Facility Services

S/n	Element	Detail
1	Perimeter wall	2 hr fire rated partition including rock wool.
2	Raised floor loading	The floor slab in the Datacentre has a uniform load of 7KN/sqm
3	Transformers and Generators	At least 2 different Transformer feed with generator backup
4	UPS system	2 x UPS system (shared mode)
5	PDU	2 Incoming feed from UPS source
6	Lighting	Light fittings designed with full parabolic mirror louver 500 lux light density
7	Air conditioning system	Supply & install CRAUs to provide N+ 1 support heatload of 476 W/sqm
8	Pre-action system	Pre-action covers Room space Under raised floor
9	FM200 system	3 layers covering under raised floor, environment surrounding and above false ceiling.
10	VESDA system	VESDA covering FM200 3 layers.
11	Environmental Monitoring system (EMS)	SingTel EMS monitors: - CRAU – covering room temperature, humidity and aircon status and alarm Water detection alarm for CRAU units and DC perimeter FM200 and VESDA system Electrical incoming failure to PDU alarm
12	General Security	Random vehicle checks, 2 levels of pass changes
13	Card Access system	Proximity card reader with breakglass, bypass keyswitch, Electromagnetic Door Lock
14	CCTV system	*CCTV cameras installed at common areas
15	Water Detection system	Point sensing water detection below the drain pan of individual CRAU and DC perimeter
16	Additional Features. Some of these features requires annual contract for use.	Meeting rooms

Table 2 - International LRIT System Facility Services

7.10 Facility Space (630sqft with 30KW)

7.11 Building Work

- Erect 2 hours of fire-rated partition including rock wool and slab-to-slab construction
- Fire pillows to seal opening create by trunkings and cable trays
- Supply 1 unit of Floor Lifter
- Provision for 24pcs. of cable access openings

7.12 Electrical Work

- Supply and install 2 no. of 60A TPN PDUs c/w 30 nos. of 32A MCCBs, ELCBs and isolator
- To provide cabling from Shared UPS system to Pole Star's dedicated PDUs.
- Consumable UPS is 30KW dual source
- Supply and install 48 numbers of 32A SPN c-form connectors for 24 racks
- Professional engineering endorsement and submission.

7.13 Lighting

- Provision to install light fittings to achieve 500luxs
- Relocation of existing light fittings to suit equipment layout.

7.14 Air Conditioning System

- 2 x 15 ton CRAU c/w flow meter, motorised valve, ductwork and accessories
- Provide 24 x 7 x 365 days air-conditioning.
- Supply & install water detection system within the private vault

7.15 Fire Detection and Protection System

- Supply and install
- 2 layers of FM200 system with VESDA.
- 2 numbers of CO2 extinguishers.
- Pre-action sprinkler points
- Smoke Detectors points

7.16 Monitoring system

- Supply & install 2 units of encerpt meter on the PDU located inside DC

7.17 Security Management System

- General physical site access security
- Card Access System To Data Centre
- CCTV

7.18 General Site Access

2 levels of security checks are required namely at the following location:

- Building lobby for changing of access pass to common areas in the data centre
- For visitors, NOC for changing pass to the access Pole Star's data centre.

7.19 The following table details the security checks that a visitor to site is subjected to

Security	
Pre arrangement	Not required
Access to main building	Random security check while accessing to the building's car park
Changing of Security Pass (Main Building Lobby)	Change for security pass at main building lobby to access to common corridors/areas of the building Need to indicate the level to access to
Changing of Security Pass (Data Center Building)	Not applicable
Changing of Security Pass (SingTel NOC)	Visitors other than tenants need to change for a dedicated pass at the building NOC to access to the private vault.
Card Access system	Installed for common space
CCTV	Installed for common space

Table 3 - Visitor Security Checks

7.20 Card Access System

Supply and install

- 1 unit of proximity card reader
- 10 access cards

7.21 CCTV

Supply and install 1 X DVR with 5 cameras.

7.22 Racks

Supply and install 24 racks of dimension 600mm X 950mm X 45RU

8 Back-Up International LRIT System Facility – TBD

8.1 The Consortium has selected the SingTel facility on account of its excellent inherent back-up and redundancy capabilities in conjunction with its disaster management strategy. Consequently, at a technical level the requirement for a back-up facility may not be necessary.

8.2 Consideration should be given to the real need for the establishment of a geographically separate and fully redundant back-up International LRIT System Facility. Technically, the implementation of a fully mirrored system capable of hot switchover would add significant complexity and cost to the project.

8.3 In the event IMSO and the IMO wish to proceed with the implementation of a back-up facility, several options are available to the Consortium. These include (but not restricted to):

- SingTel can offer a redundancy site for the System similar to the facilities to the primary site.
- Several other major commercial hosting providers could be considered.

Specific details will be disclosed and discussed during contract negotiation.

9. International LRIT System Communication Services – SingTel

9.1 To take advantage of bulk purchase discounts it is proposed to enter into a service agreement with SingTel for the provision of Inmarsat C and Iridium airtime for Sea Areas A1-A3 and A4 respectively. SingTel is a strategic partner and leading provider of Inmarsat services, with 20 years of satellite communications experience.

9.2 SingTel has 4 highly secured satellite Earth stations located in Singapore – Sentosa, Bukit Timah, Seletar and Tampines Telepark. Other considerations include:

- High Security – Armed security guards with video surveillance CCTV system and fence perimeter intrusion detection system.
- Power Facility – Two incoming feeds from commercial power supply with UPS system and 4 generators for power supply back-up.
- Fire Protection & Alarm Systems – Equipped with a comprehensive fire alarm detection and protection system and fire evacuation plan.
- 24x7 Support – Round-the-clock technical support and helpdesk by an English-speaking team of technicians and engineers.
- Full System Redundancy - SingTel owned nation-wide fibre network and provide RF and baseband redundancy in the Earth stations.

Figure 2 - SingTel's Earth Stations

10 International LRIT System User Support Operations Centre – WIS

10.1 User support will be critical to the success of the overall LRIT program. Pole Star have gained considerable expertise in the provision of support to its 500+ clients and currently operates a single shift system with four customer service personnel and four technical support personnel (collectively managing 10,000 ships).

10.2 Support and training interaction can be anticipated with the following entities:

- Contracting Government users (National Administrations / Flag Registries)
- Port-State users
- Coastal-State users
- SAR users
- Ship owners
- Ship masters
- IMSO / IMO
- SingTel (as Communication Services Provider)
- SingTel (as International LRIT System Facility Service Provider)
- Pole Star / GateHouse (as Application Services Providers)
- Shipborne equipment manufacturers

10.3 Quality of Knowledge Workers

Filipino ICT professionals boast of a broad range of capabilities from management to technical know-how and, with a consultative and customer service mindset, interpersonal aptitude. They possess world-class English proficiency superior to that of other offshore destinations. They also have excellent work ethic, which leads to low attrition rates.

10.4 Moreover, since the cost of living is lower in the Philippines than in more advance economies, ICT professionals in the country can afford to cut their professional fees to about a fourth to a fifth lower than that of their counterparts.

10.5 Government and Private Sector Support

Plans and Policies - Headed by President Gloria Macapagal-Arroyo herself, the Information Technology and E-commerce Council (ITECC), with representatives from the private sector and from government agencies, is the country's highest ICT policymaking body.

10.6 Security - Several measures are enforced to ensure the protection of intellectual property rights, privacy and data security: (1) The Intellectual Property Code of the Philippines, (2) WTO's Trade-Related Intellectual Property Agreement (TRIPS), and (3) WIPO Copyright Treaty.

10.7 Focused Training - The private sector is supported by the Philippine government in coordinating programs to encourage the growth of the ICT industry. These programs have resulted in a number of focused training options that have bolstered the workforce with valuable skilled labor.

10.8 Infrastructure

The Philippines has a solid system of power and telecommunication infrastructure. There is redundant international connectivity, including fiber optic cables and satellite communication, and a significant amount of trans-Pacific data communication bandwidth is readily available. High-quality, low-cost bandwidth is expanding the domestic telecommunication network while a number of international carriers for telecommunication services are providing a competitive landscape for buyers.

10.9 Special economic zones, or what are known as IT Parks and/or Buildings, have ample and up-to-date telecommunications capabilities: (1) an abundant supply of available telephone lines, ISDN, and fiber optic technologies, and (2) a clean, uninterruptible power supply and computer security, and building monitoring and maintenance systems.

10.10 WIS has established that a support team of 16 staff per shift would be required to support 20,000 ships. This staffing level was established by using the current staffing levels at Pole Star. It is believed that it may be possible to reduce this staffing once bespoke systems have been built and / or the initial teething issues of the service have been resolved.

10.11 It is intended that the senior staff for the service, and team leaders for each shift, be ex-2nd Officers or Master Mariners. This has proven effective with WIS's DPM contract (DPM Singapore are a UKHO chart and publications company) and will ensure the correct focus of the support staff. The general support staff will be suitably trained IT graduates and the finance

support staff will be accounting graduates lead by qualified account(s). It is the cost effectiveness and availability of the Philippine work force that allows this high level of staff to be deployed at a reasonable overall cost.

10.12 A gradual increase in staffing levels is planned to ensure unnecessary support costs are not incurred. The actual staffing levels and timings will have to be confirmed once the overall project approach and timelines have been agreed.

10.13 The service has been costed with the use of Computer Associates' (CA) Service Desk. This system is widely recognised as best in class and will ensure the systematic logging, tracking and escalation of support tickets. With some bespoke development we are sure that this system will provide internal and external parties the required visibility to service levels.

10.14 WIS runs a modified version of Rational Unified Process not only for software development and support, but also in its business process off-shoring operations. Processes are reduced to Use Cases and fully documented as if they were to be enacted in software. By this methodology we increase the granularity of documentation well beyond anything required by quality systems such as ISO. This level of granularity allows us to establish best practices for processes and / or process fragments, and to ensure that suitable metrics and KPI's can be put in place and monitored. These combined serve to ensure that the Service Level Agreement (SLA) attached to a contract can be proactively monitored and reported in near real time.

10.15 Quality of Service Certification

- WIS Clark is ISO 9001:2000 accredited.

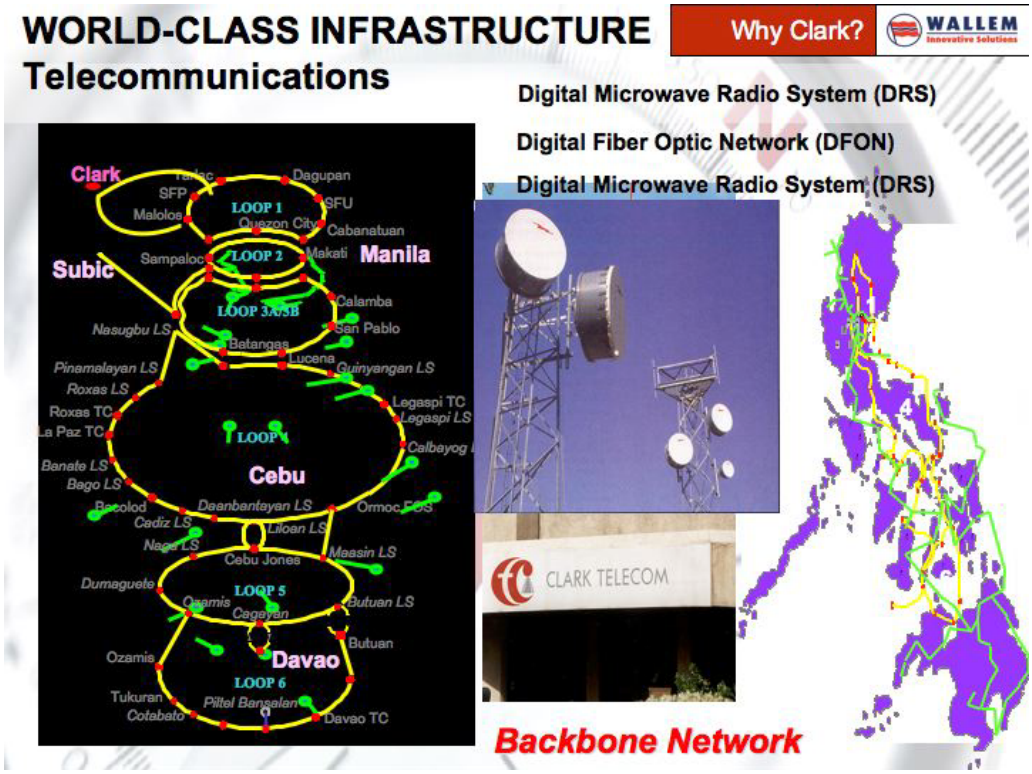

Figure 3 - Telecommunications Infrastructure

Figure 4 - WIS's Facility at Clark

11 Phase 2a and 2b

11.1 It is proposed that on an annual basis any revenue generated from Phase 1 usage that exceeds the quoted budgetary requirements will be accumulated to create a set-aside budget for the implementation of a System fully *technically compliant* to the technical specifications developed by the AHWG. Implementation of the System will take place in Phase 2a and the operation of the System in Phase 2b over 12 months and 24 months respectively.

11.2 Prior to contract negotiations, award, and Phase 1b operations, there is little point in addressing the detailed Phase 2 project and technical management aspects, other than to estimate the potential cost of the development and so anticipate the level of set-aside budget (this aspect is presented in the Financial Proposal).

11.3 It is the Consortium's view that System support services: including facility, communications and user support operations will be maintained during Phase 2a using the same service providers.

ANNEX 3 - FINANCIAL PROPOSAL

12 Costs

12.1 For purposes of technical and financial modelling it has been assumed that an approximate total of 20,000 ships will be managed by the System *on behalf* of those Contracting Governments not establishing a National Data Centre (or joining with a Regional or Collaborative Data Centre).

12.2 After diligent financial analysis the following costs are presented. Note that these are Rough-Order-of-Magnitude costs – detailed component costs will be disclosed at the contract negotiation stage.

Cost Element	Phase 1a	Phase 1b	Phase 2a	Phase 2b
Project Management	0.05	0.5	0.1	0.35
Flowthrough equipment / licenses	0.025	0.1	0.05	0.075
Non-Labour travel / subsistence	0.025	0.1	0.05	0.075
System Management	0.05	0.5	0.1	0.35
IDE / IDC Component Licensing	0.5	1.5	1.5	1.0
System Facility	N/A	1.0	N/A	0.75
Power utility charge	N/A	0.05	N/A	0.05
Internet access (32Mb)	N/A	0.1	N/A	0.075
System Communications	N/A	2.75	N/A	2.0
User Support Operations Centre	N/A	3.75	N/A	2.5
TOTAL	**0.65**	**10.35**	**1.8**	**7.225**
Per year	N/A	**3.567**	N/A	**3.613**

Table 4 - Costs

12.3 Phase 1 Financial notes:

- All figures are quoted in Million GBP Sterling (£).
- Minimum contract term is 3 years.
- One-time setup charges are non-refundable.
- Service termination charge is 100% of the remaining contract term.
- System Communications based upon standard commercial rates as of July 2007).

12.4 Phase 1 Comparative Position Report Cost / Volume analysis

- Volume of Position Reports per Day = 20,000 ships x 4 / day = 80,000
- Volume of Position Reports per Year = 29.2M
- Volume of Position Reports in Phase 1 = 87.6M
- **"Neutral Cost" per Position Report**
- = Total Phase 1 Cost / Volume of Position Reports in Phase 1
- = 11M / 87.6M = £0.125 (or approx. $0.25)

12.5 A Position Report cost of £0.12 (approximately US $0.25), whilst derived from raw cost data and assuming 20,000 ships, equates coincidentally to standard commercial rates published by those ASP's offering ship tracking services.

12.6 Phase 2a development costs have been estimated at approximately £1.8 million (E) and Phase 2b service and support costs are expected to remain stable subsequent to the application of a standard inflationary factor. Consequently, the anticipated Position Report cost remains £0.12 (approximately US $0.25).

12.7 Phase 2 Comparative Cost / Volume analysis

- Volume of Position Reports per Day = 20,000 ships x 4 per day = 80,000
- Volume of Position Reports in Phase 2 = 58.4M
- **"Neutral Cost" per Position Report**
- = Total Phase 2 Cost / Volume of Position Reports in Phase 2
- = 7.2M / 58.4M = £0.125 (or approx. $0.25)

13 Revenue

13.1 After careful consideration the following revenue model is presented based upon the concept of two System user-types:

13.2 Provider - Subscription / Ship Integration Fee

13.3 Contracting Governments may choose to have their applicable flagged ships managed by the System for purposes of LRIT compliance rather than invest in a National LRIT Data Centre and undertake LRIT compliance management independently (or equally a Regional or Collaborative LRIT Data Centre).

13.4 On this basis the System should be considered as managing those ships *on behalf of* the Contracting Government concerned, and with this in mind a combined Contracting Government Subscription / Ship Integration Fee is proposed to form the start-up budget to fund a proportion of Phase 1.

13.5 A proposed fee structure of £100 per ship is simple, fair and equitable. The following calculation determines the revenue generated:

- **Subscriber / Ship Integration Fee Revenue = 20,000 ships x £100 per ship = £2.0M**

13.6 User – LRIT Information Fee

13.7 The following calculation determines the target annual revenue and number of position reports required to be purchased to meet the target (based on a "neutral cost" of £0.12 for each position report i.e. with no "user-overhead" included):

- Phase 1 development and operating budget = £11M
- Subscription / Ship Integration Fee (adjustment) = £2M –
- Target Phase 1 revenue = £9M
- Target annual revenue = £3M
- **Required number of position reports**
  = Target annual revenue / Neutral cost per position report
  = 3M / 0.125 = 24M

13.8 A 24M position report target represents a significant amount given that the figure equates to 82% of the total acquired position reports annually. By way of comparison, the U.S. has estimated that it would potentially use 3.7M position reports annually from foreign flagged ships, or just 15% of the target.

13.9 Unless user commitments are made by Contracting Governments that result in the target being reached the LRIT information fee cost will have to be increased accordingly. By way of the same example, if the U.S. commit to usage at the level described above, the cost of each position report, in the absence of any other Contracting Government commitment, would have to be increased using the following calculation:

- **"Example Annual Laden Cost" per Position Report**
  = Target annual revenue / Volume of Position Reports per Year
  = 3M / 3.7M = £0.81 (or approx. $1.62)

13.10 It would be fair to assume that the above revenue model would be unworkable. By way of further example the following table shows a sliding scale of position report cost against position report target:

Position Report Cost (£)	Position Report Target
0.125	24M
0.15	20M
0.20	15M
0.25	12M
0.30	10M

Table 5 - Position report cost against position report target

13.11 Due to the inherent risk of the above revenue model an advanced payment system will have to be imposed. This will be quarterly system based upon estimation of the number of position reports to be acquired by each subscriber (each subscriber will specify this as per the

U.S. position). Adjustments and corrections will be made each quarter. As more subscribers use the System and acquire more position reports the more cost-effective the system becomes.

13.12 For the System to be economically viable a critical mass of Contracting Governments are required to commit to the defined subscription level and usage to a level above 10M position reports per year.

13.13 It is proposed to create a set-aside budget for the Phase 2a implementation phase from the additional revenue generated in the event that greater than 24M position reports are used annually (rather than reduce the position report cost further). Furthermore, in the event that the required £1.8M budget is accumulated in less than the planned 36 months of the Phase 1b duration, Phase 2a may begin in advance of the planned date.

ANNEX 4 – SUPPLEMENTARY INFORMATION

14 Pole Star Space Applications Limited (UK)

14.1 Pole Star was established in 1998 and today has 35+ dedicated staff located across our London HQ and Hong Kong, China offices, and further satellite offices in Vancouver and Auckland. We are privately owned, independent and neutral. We directly manage primary client accounts and also work through a global network of professional maritime services partners and Approved Service Centre's to offer and support these products and services. Critically, we have 500+ valued shipping company clients managing 10,000+ ships, placing Pole Star as the world's leading provider of web-based ship telematics solutions.

14.2 We are structured as a service provision and support organisation which includes the following departments: corporate, sales, marketing, customer service, technical support, accounts and billing, IT development and support.

14.3 We offer a suite of maritime telematics solutions powered by Purplefinder® - the original web-based tracking system, combining both System Integration (of data communication equipment, communications services, third-party monitoring systems, and Internet delivery technologies) and Application Services Provision (of innovative web-based user interfaces). In summary, we provide cost-effective commercial and regulatory solutions for clients responsible for assets operating in remote and hostile environments.

14.4 Products and References

- **Fleet Management** - our Fleet Management range of products is used by shipping lines, ship managers, owners and charterers to track their fleets and manage operational productivity. The advanced versions incorporate weather forecasting, marine charts, communications capability and voyage planning tools. Our Fleet Management system is a powerful web-based service that provides an effective way of automatically tracking and managing ships in real time.

- **Alert** - Ship Security Alert Systems (SSAS) are now mandatory on commercial ships over 500 gt engaged in international voyages. Our Alert suite of products is fully SOLAS XI/2-6 compliant. Our SSAS system comprises two parts: the hardware which sends and receives signals to the satellite, and the online service which displays alerts and routes them to the correct person.

- **MarVTS** – is a general Maritime Vessel Tracking System and outsourced National LRIT Data Centre solution offered to Maritime Administrations for Flag-State, Port-State Control and Coastal-State applications. This product has been adopted by the Republic of the Marshall Islands Maritime Administration.

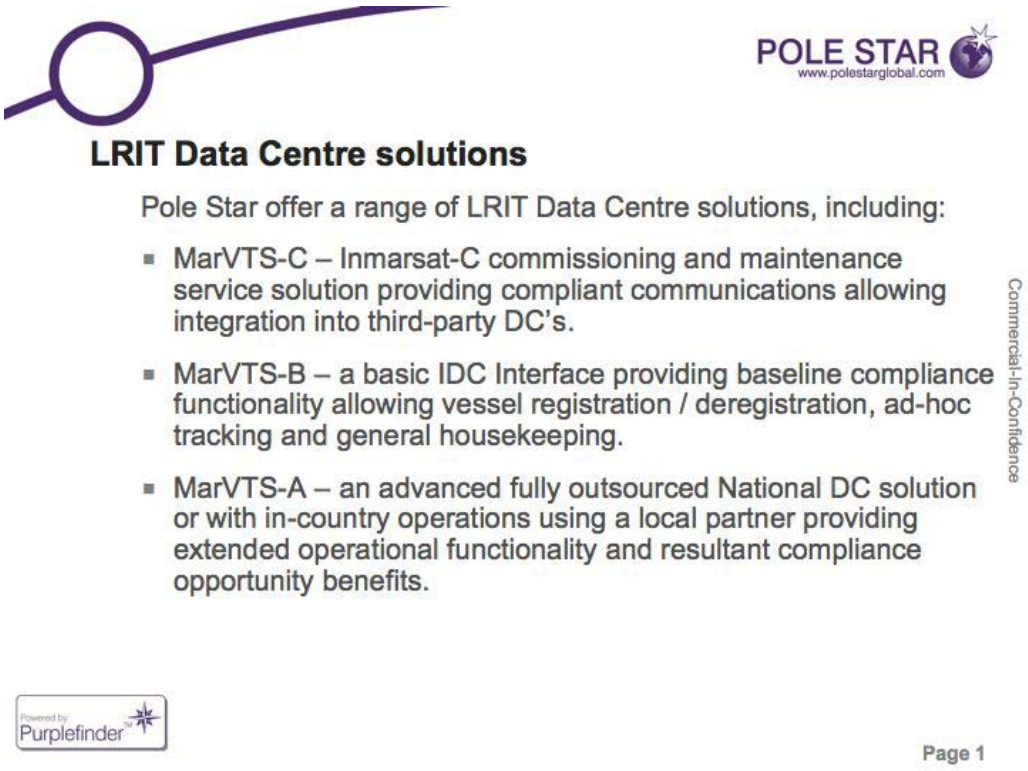

Figure 5 - Pole Star's MarVTS Product Series

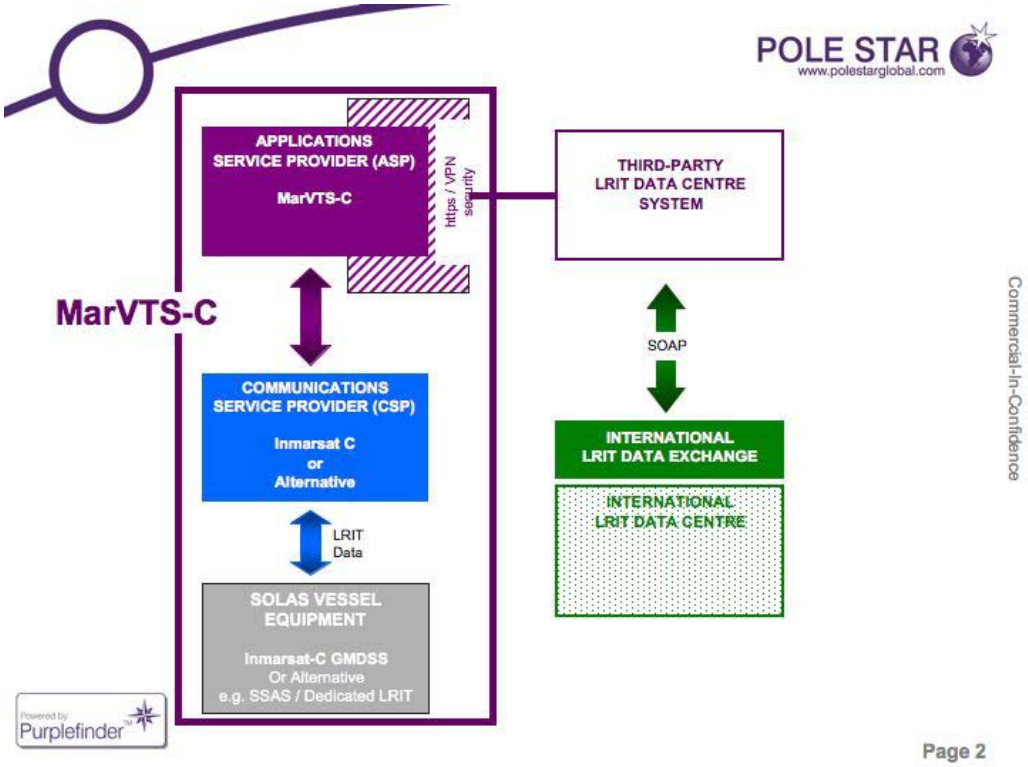

Figure 6 - MarVTS-C

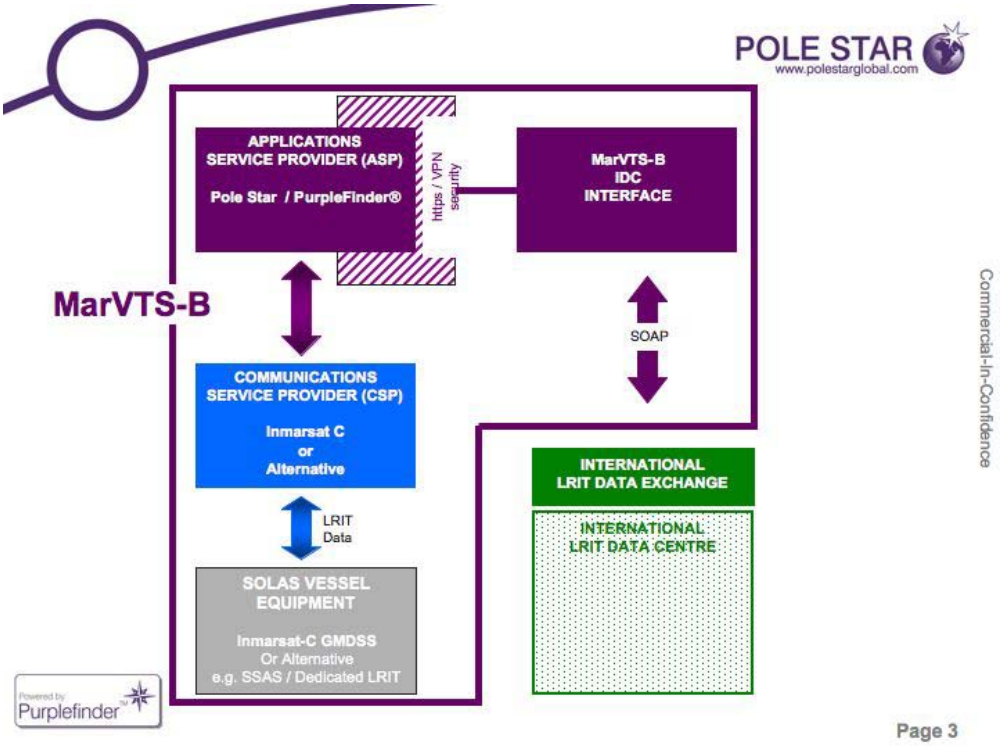

Figure 7 - MarVTS-B

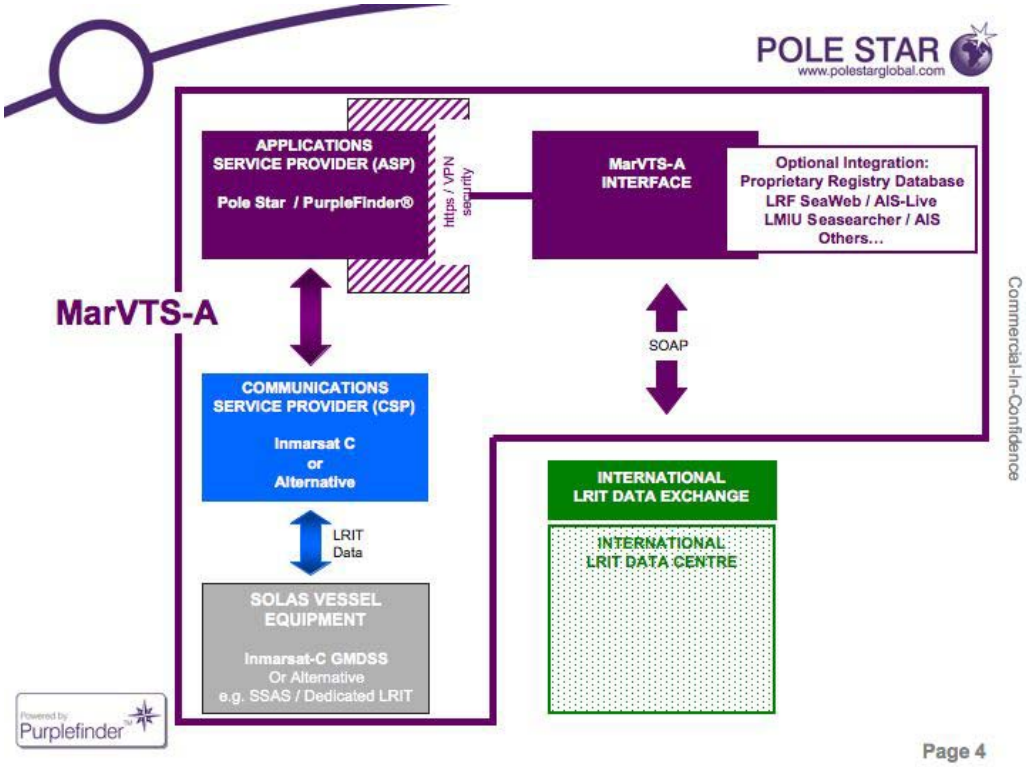

Figure 8 - MarVTS-A

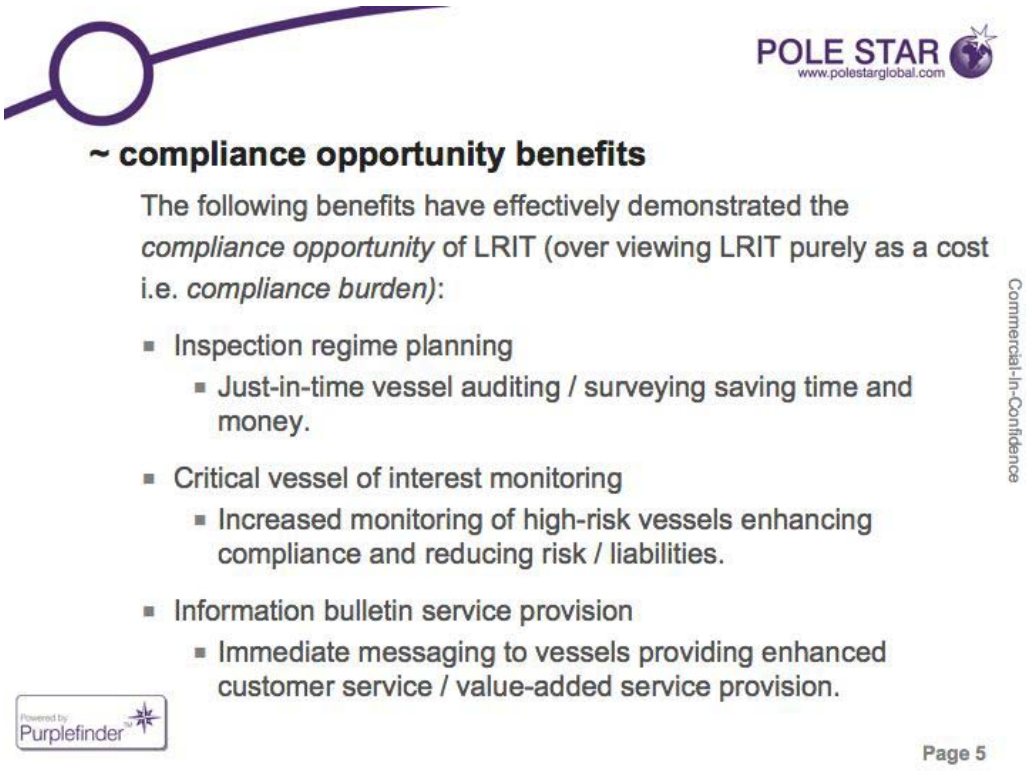

Figure 9 – Compliance Opportunity Benefits I

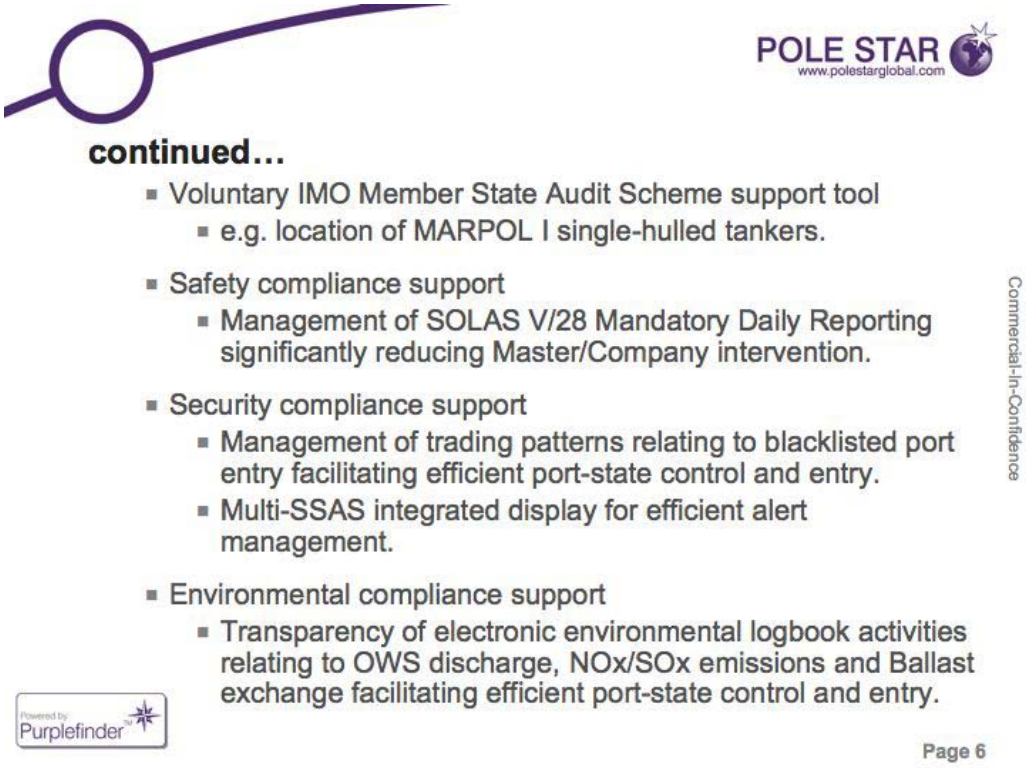

Figure 10 - Compliance Opportunity Benefits II

15 GateHouse A/S (Denmark)

15.1 GateHouse was founded in 1992 and today has a staff of approximately 100. The majority of employees are software engineers, highly dedicated and skilled, with more than three out of four holding a MSc degree or higher. Many have worked with mission critical projects for several years. To ensure top quality and continuous improvement in software development we use the CMMI standard and are ISO 9001:2000 certified.

15.2 We specialise in technical software development and system integration for advanced communications systems and offer a range of unique products and services to international market niches. Our capabilities in software development and project execution allow the company to supply bespoke world-class solutions.

15.3 We are dedicated in the development of protocol stacks for satellite communication and software for Automatic Identification Systems (AIS). We provide best-in-class solutions for tracking of maritime traffic and have delivered complex solutions to a number of National Administrations. We are continuously extending our AIS business by developing state-of-the-art IALA-compliant AIS and tracking technology, acting as a supplier of software to regional, national and local projects. GateHouse possesses the necessary competences to meet the goals of the LRIT programme. We comply with CMMI and IEEE procedures and templates.

15.4 Products and References

- **HELCOM and North Sea Project** – an AIS data exchange system between all the countries surrounding the Baltic Sea. The system handles data distribution, storage, user rights and visualisation of data. Similar systems include: North Sea AIS-Information Server – an AIS data exchange system between the North Sea countries with added functionality including monitoring of single hull tankers.
- **National Systems** - Danish Administration of Navigation and Hydrography – a data acquisition, distribution and storage system with built-in redundancy and designed for very high up-time rates, Irish National AIS system - similar to the Danish system. Swedish Maritime Administration - a sophisticated AIS system with advanced display facilities and highly advanced tools for statistical use used for planning and compilation of risk analysis. Gdynia Maritime Administration (Poland) - an AIS Control Centre solution built on top of the already existing Saab network providing database, statistical functions and watchdog functions (surveillance module) for the VTS centre, and further providing a number of GateHouse AIS Display Systems (GAD) for other distributed Polish VTS centres.
- **Marine Exchange of Alaska** - a system web display solution with database management and statistical analysis modules.

15.5 ghTRACK™ – is the name for a software framework including a large amount of basic functionality for general tracking and system management features. The basic framework provides the generic software elements which are extended with application specific software depending on the user requirements and market specific standards:

More specifically the characteristics and elements of ghTRACK™ generic tracking framework are:

- Modularity – the modular approach to software design allows to easily create highly redundant, scalable and robust systems.
  The software modules are combined to provide different functionality and solutions. The ghTRACK™ framework is based on a Service Oriented Architecture.
- Database module – The Database Module supports storage of a large amount of tracking data as supports statistical analysis and incorporates seamless backup integration.
- Event monitoring and replay module – The event monitoring and replay functions are powerful tools when investigating and documenting incidents (SAR, collisions, etc.). Stored data can be filtered and replayed to find the information of interest. The stored data has proven admissible in legal proceedings.
- Data distribution module - includes user access control, filtering of data to different users, and data encryption.
- Data import / export module – Data import/export functionality includes mechanisms for obtaining data through TCP/IP, SSL and UDP. Supported formats currently include standard NMEA messages, XML exchanges and SOAP interfaces.
- WatchDog module – The WatchDog module is an optional surveillance module which provides automatic real-time detection of user defined events. Automatically detectable events include: target entering/leaving zone, blacklisted target entering zones, ship speeding within a zone, ship sailing in wrong direction, near miss between vessels or with buoys, grounding, draught, air-draught violation, and many more.
- Filtering Module – Filtering can be performed on input data, i.e., incoming tracking data, as well as output data going to users or other systems. Examples of filters include: Geographic, Vessel type, Vessel attribute and many more.
- System Management and Monitoring - An industry standard system management and monitoring suite provides system-wide diagnostics and performance monitoring.
- User management – The user management module allows users to be easily created and administered. The module implements a group concept, allowing administrators to easily configure multiple users.
- Track Display Systems– Track Display systems are provided either as client based or as web based applications. The fully IALA compliant display systems and corresponding tool offers a large number of advanced features specifically developed for vessel tracking. The Display system features provide flexible interfaces that are easily customised.
- WebSTAT – The WebSTAT Statistics Module is a highly efficient, advanced yet intuitive web based tool, which can be used to generate a wide range of reports based on stored tracking data. The statistical reports assist operators in improving maritime safety and awareness. A large number of reports, including passage line statistics, vessel history reports and density plots, to name a few.
- Risk analysis tools – Based on statistical models the risk tool analyses (currently under development) makes predictions concerning specific risk scenarios available to

the user. The risk models uses real recorded tracking data and as well and user-defined tracking data.

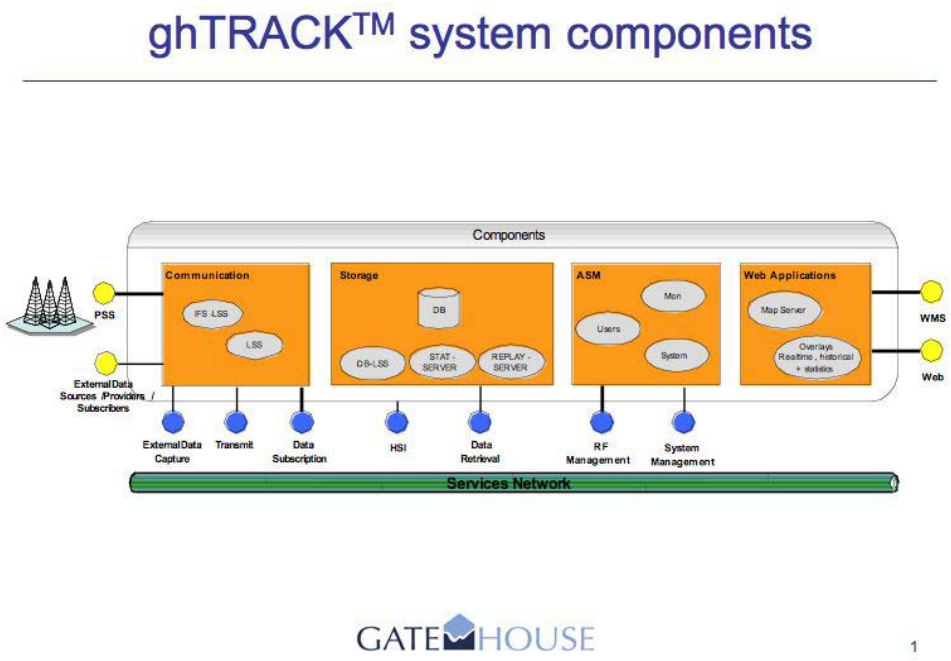

Figure 11 - ghTRACK™: an expandable, service-oriented architecture

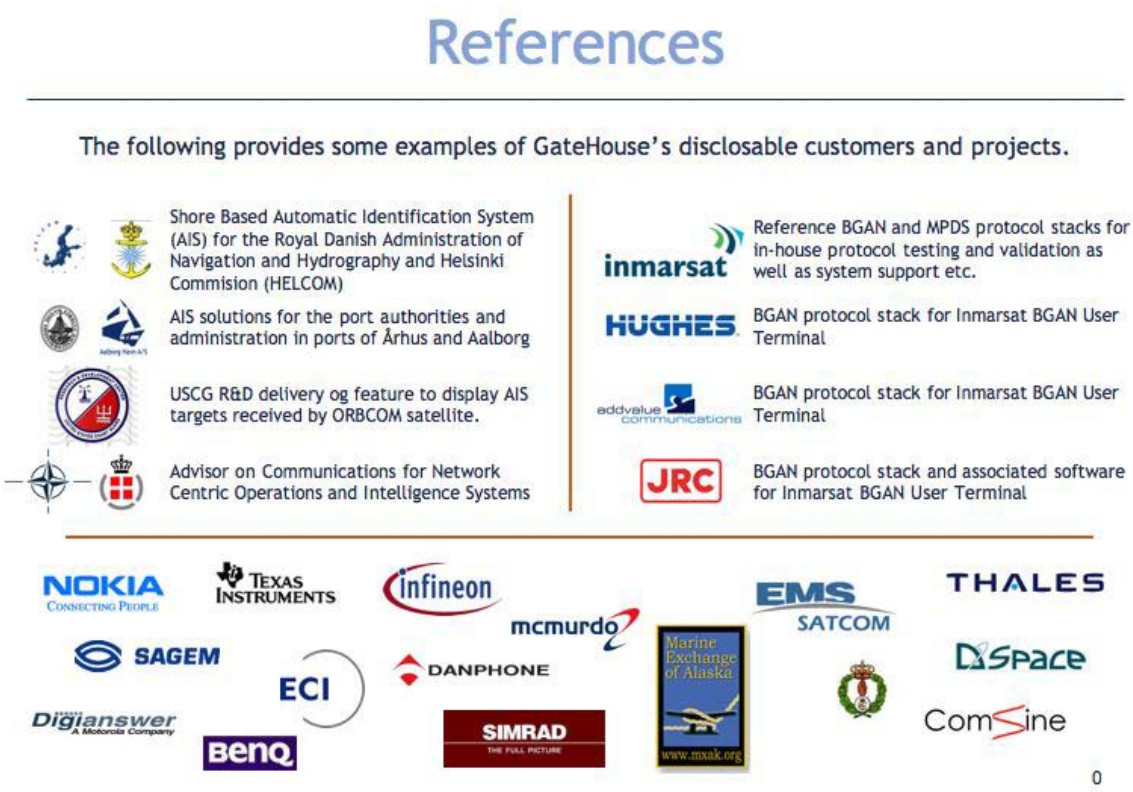

Figure 12 – GateHouse references: high-quality / low-risk systems

16 Wallem Innovative Solutions (Philippines)

16.1 Wallem was formed in 1903 and currently has 300 vessels in third party management. In addition to its third party ship management division, Wallem has a large port agency network covering most of South East Asia, and has ship broking offices in Hong Kong, China. Further information regarding the Wallem Group can be found at www.wallem.com.

16.2 Wallem Innovative Solutions (WIS) is a wholly owned subsidiary of Wallem Group. The division was formed in 2000, and consists of Wallem Innovative Solutions Limited (a Hong Kong, China incorporated company) and a wholly owned subsidiary Wallem Innovative Solutions Philippines Inc (a Philippines incorporated entity). This structure allows contacting parties to enter contracts under English or Hong Kong, China law.

16.3 With the establishment of our purpose built offices at Clark Freeport, the previous US air force base, we have been able to leverage the skilled and cost effective work force available in the Philippines. Originally established to provide IT development and support for the Wallem Group, vessels under management and its clients, WIS Clark has expanded to providing these services plus business process off-shoring for the Wallem Group and third parties.

16.4 The infrastructure, both IT / communications and utilities at Clark are based upon what the Americans built for their air force. Having this solid foundation to build upon has allowed the Philippine government to provide facilities and service levels at Clark that are not normally found in the rest of the country.

16.5 For disaster recovery and business continuity WIS uses either the Group's business continuity facilities or contracts these services separately should clients require.

16.6 Products and References

- WIS is providing software development and support services for LR in support their maritime business division. This five-year contract demonstrates that geography need no longer be an impediment to off-shoring. WIS is able to combine and leverage the maritime domain knowledge of the Wallem Group and the skilled and cost effective work force available in the Philippines to ensure that LR receive world class development and support for their systems and their clients.

- WIS is providing business process off-shoring services for DPM Singapore, a UKHO chart and publications company. The Chart Folio Management Service contract requires WIS staff to manage the chart folios of DPM's customers. The team at Clark is headed by an ex-2nd Officer, and this ensures that the team is aligned with and understands their ultimate customer, the deck officers onboard the vessels.

- WIS is providing Flag State versions of Wallem's vessel condition reporting tool TransparentSea Reporting Solution (www.transparentsea.com).

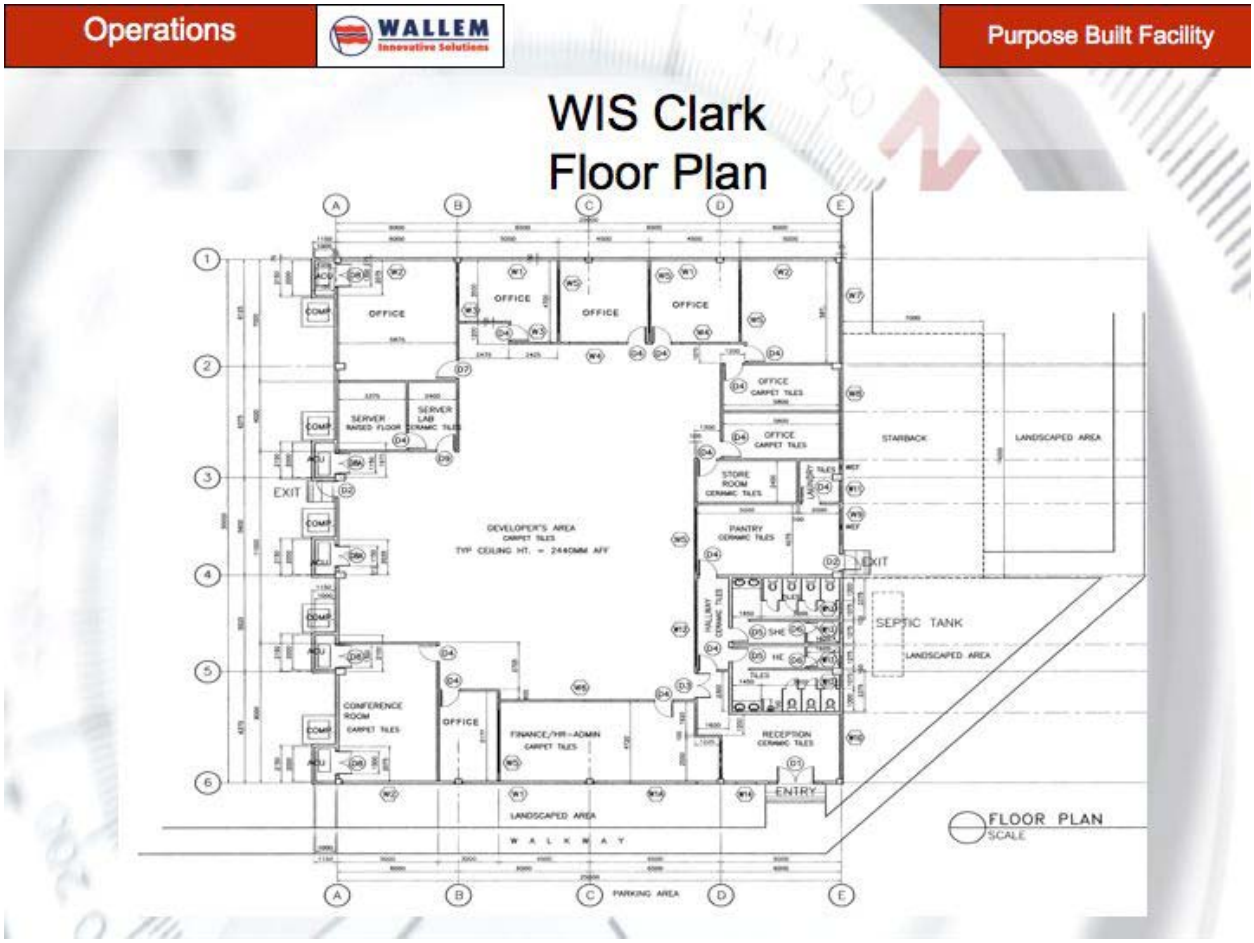

Figure 13 – WIS Floor Plan

17 Singapore Telecommunications Limited (Singapore)

17.1 SingTel Group is Asia's leading communications company, having 125 years of experience and has investments and operations in more than 20 countries/territories. The company is also the largest company by market capitalization (>SGD 50 billion) on the Singapore Exchange. SingTel provides a diverse range of services including mobile, fixed-line voice, data, broadband Internet and satellite services, as well as data centre and integrated IT& communications solutions.

17.2 Products and References

EXPAN is a Pan Asian chain of world-class Data network Centres, owned and built by SingTel, Asia's leading communications company. It provides secured hosting environment equipped with state-of-the art facilities where customers can host their servers and have the option to outsource their IT and network systems and operations. Data Centre resources can be easily scaled to the customer's business needs.

The Data Centre facilities enable multinationals, Internet and application service providers across Asia to outsource their entire or part of their communication networks and web-hosting needs to SingTel. EXPAN services include the provision for co-location, bandwidth, IT-related operations and storage facilities. EXPAN works with leading players in this field to offer customers a complete solution for disaster recovery and business continuity needs. The Data Centres are connected by SingTel's own fibre, highly robust, cable and satellite telecommunications network infrastructure. They also include connectivity to Asia's largest Internet Backbone (STiX) and also Asia's Leading Managed Network (ConnectPlus).

EXPAN has 10 data centres in 4 countries: Singapore (4x), Australia (2x), Hong Kong, China (2x) and Japan (2x). SingTel also offers hosting services through marketing alliances with Republic of Korea, China, India, Indonesia, Thailand, Philippines, Malaysia, USA and UK.

In EXPAN's Data Centres, customers can enjoy 24x7 network monitoring, systems administration and maintenance, security services, data storage and administration, performance monitoring and fault management, problem resolution and technical support. Through EXPAN, it enables customers to have a single point of contact for multi services in multi sites.

EXPAN has also leveraged the technology of the best-of-breed technology players in the market to support the provision of services in our regional Data Centres. Our partners BMC Software, Cisco Systems, EMC, Hewlett-Packard, Netscreen, Oracle, Sun Microsystems and Veritas will provide the equipment, software solutions and expertise to complement our telecommunications offerings.

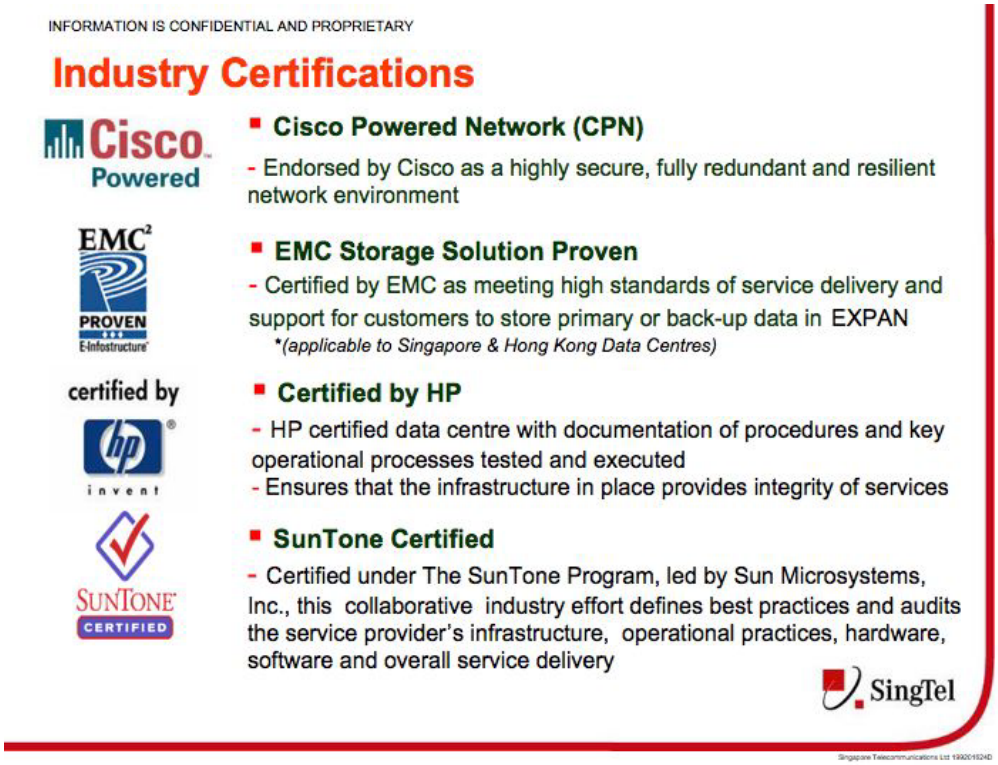

Figure 14 - SingTel's Industry Certifications

Figure 15 - SingTel's Reference Clients